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MEMORANDUM

TO: Patrick Goddard, Director of Facilities, Town of Lexington
Paul B. Ash, Ph.D., Superintendent, Lexington Public Schools

FROM: Matt A. Fragala, M.S., C.I.H., Senior Scientist
David L. MacIntosh, Sc.D., C.I.H., Principal Scientist

DATE: October 27, 2011

RE: Report on Indoor Air Samples Collected on October 7, 2011, at Estabrook Elementary School, Lexington, Massachusetts (EH&E 17892)

This memorandum provides a description of the monitoring for polychlorinated biphenyls (PCBs) in indoor air of Estabrook Elementary School conducted on October 7, 2011.

SUMMARY OF FINDINGS

- The average concentration of the most recent round of air sampling is 78 nanograms per cubic meter (ng/m^3) with a maximum concentration of 114 ng/m^3

- Modifications made to room 21B were observed to effectively provide ventilation to the classroom. Airborne PCB concentrations and ventilation rates measured in room 21B on October 7, 2011, were similar to room 21A and other classrooms in the School.

- PCB concentrations in indoor air were below the threshold for follow-up assessment (173 ng/m^3) in all locations.

- Sampling results do not alter the estimated school year average range of 115 to 125 ng/m^3 presented in the August 29, 2011, memorandum.

- Three additional rounds of sampling for the 2011-2012 school year are planned for December 2011, April 2012, and June 2012.

BACKGROUND

As part of the Operations and Maintenance (O&M) Plan, multiple rounds of air sampling have been completed at the School. The objective of the air testing program is to evaluate PCB levels in indoor air of classrooms relative to performance criteria established in the O&M Plan and cited above. The O&M Plan developed for the School states that potential exposure to airborne PCBs shall be controlled to as low as reasonably achievable, and in all cases shall be less than the annual average value of 230 ng/m^3, the target established based on classrooms for children less than 6 years old. Also, a single measured concentration greater than 75% of the annual average target will initiate a follow-up assessment to determine the conditions contributing to the levels of PCBs in the air in that location. On October 7, 2011, EH&E issued a memorandum with a sampling schedule for the 2011-2012 school year based on suggestions from the Estabrook community and the Town of Lexington.

Conditions During Sampling

Mechanical systems in the School were operated in accordance with the O&M Plan. All indoor air sampling was conducted with windows and doors closed. Air samples were collected from approximately 8:30 a.m. – 3:30 p.m. on Friday, October 7, 2011. The average ambient temperature during the sampling period was 58 degrees Fahrenheit (°F). The thermostat in each room was set to 68 °F.

Air Sample Results

As shown in Table 1 (refer to attachment), PCB concentrations in indoor air of the rooms tested on October 7, 2011, ranged from 52 ng/m^3 to 114 ng/m^3. PCB concentrations for all samples were less than 173 ng/m^3, the threshold for follow-up assessment.

The plot in Figure 1 demonstrates the relationship between PCB concentrations in indoor air of Estabrook and ambient temperature for the period of November 4, 2010 – October 7, 2011. The average October 7, 2011, values are plotted in red. The October 7 air samples targeted an ambient temperature range not measured during previous rounds of sampling. The October 7 air sampling results are consistent with previous observations. These observations suggest that with mitigations measures in place and standardized ventilations rates, variation in ambient temperature appears to be an important determinant of PCB concentrations in indoor air of the

school. Air sampling data collected later in the school year will be used to further evaluate the relationship between temperature and airborne PCB concentrations in the School.

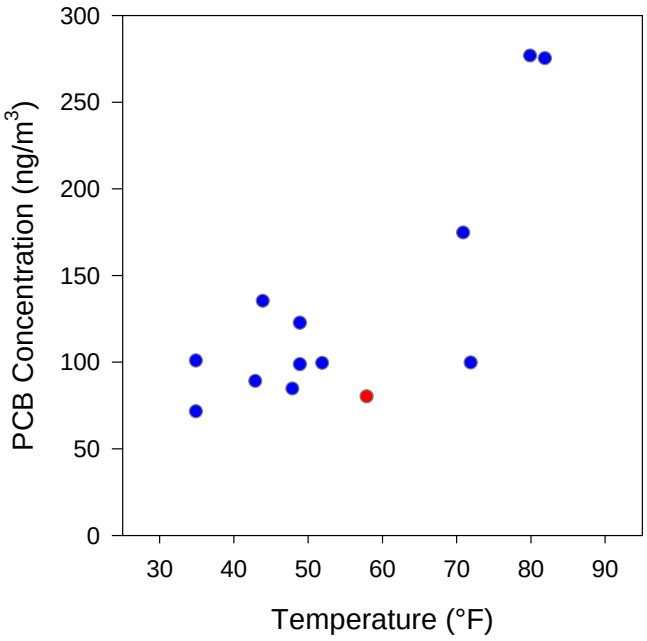

Figure 1 Average Indoor Air PCB Concentrations at Estabrook Elementary School Compared to Average Ambient Temperature during the Sampling Period (November 4, 2010 – October 7, 2011)

If you have any questions regarding this memorandum please do not hesitate to contact us at 1-800-TALK EHE (1-800-825-5343).

Attachment

Table 1 Air Sample Results for Total Polychlorinated Biphenyls, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, July 22, 2010 – October 7, 2011*

Sample Date:	2010												2011						
	July 22[a]	August 25-27[b]	September 6[c]	September 19[d]	September 27[e]	September 29[f]	October 18 and 19[g]	November 4[h]	November 11[i]	November 20[j]	November 24[k]	December 2[l]	February 23[m]	April 20 and 21[n]	May 21[o]	June 9[p]	July 13[q]	July 14[r]	October 7[s]
Location	**Total PCBs (ng/m^3)**																		
Room 1	299	426	118[‡]	63[‡]	76[‡]	153[†]	145	–	116	–	–	–	146	–	–	–	–	–	–
Room 2	–	775	455	189	166	253[†]	53	–	60	–	–	–	–	136	–	–	312	43	100
Room 3	–	–	–	–	–	364[†]	111	–	110	–	–	–	–	44	–	–	–	–	–
Room 4	–	–	–	–	–	344[†]	126	105	–	–	–	–	–	–	217	152	348**[AF]	237[AF]	114
Room 5	459	736	320	196	149	209[†]	79**	–	128	–	–	–	–	–	103	–	–	–	–
Room 6	1,800	764	483	171	213	383[†]	182	131**	–	–	–	–	97	–	–	–	9[WO]	163[WO]	–
Room 7A	–	–	5.19	–	–	–	–	–	–	–	34	–	–	15	–	–	–	–	–
Room 7B	–	–	–	–	–	–	–	–	–	–	<5.3	–	–	57	–	–	–	–	–
Room 7C	–	–	–	–	–	–	–	–	–	–	–	–	13**	–	–	–	–	–	–
Room 11	–	–	–	–	–	–	–	–	65	–	–	–	–	–	153	–	–	–	–
Room 13	319	340	184	155[†]	–	–	–	–	92**	–	–	–	94	–	–	–	–	–	57
Room 19	–	–	–	–	–	–	–	–	12	–	–	–	–	–	132	–	–	–	–
Room 20	–	–	–	–	–	–	–	–	–	57	–	–	–	167**	–	–	515[AF]	244[AF]	80
Room 21A	–	–	410	193	–	–	–	–	–	–	–	109	103	–	–	–	–	–	79
Room 21B	–	–	–	–	–	–	–	–	–	188	–	–	–	–	566	594**	–	–	66
Room 22	–	–	–	–	–	–	–	–	–	25	–	–	–	–	224**	291	337	177	–
Room 23	–	–	–	–	–	–	–	–	–	142	–	–	–	93**	–	–	–	–	–
Room 24	680	601	226	173[†]	–	–	–	–	–	106**	–	–	86	–	–	–	233[WO]	116[WO]	52
Room 25	–	–	–	–	–	–	–	–	–	130	–	–	–	135	–	–	–	–	–
Room 26	–	–	–	79	–	–	–	–	–	–	47	–	–	–	58	–	–	–	–
Room 27	–	–	–	–	–	–	–	–	–	–	69	–	–	–	15	–	–	–	–
Room 31A	562	575	444	–	–	282	–	–	–	94	–	–	–	97	–	–	175	78	75
Room 31B	–	–	–	–	–	–	–	–	–	135	–	–	–	52	–	–	202[WO]	65[WO]	–
Room 39B	–	419	–	–	–	–	–	–	–	64	–	–	–	–	132	–	179[AF]	45[AF]	66
Room 39C	342	495	245	100	–	–	–	–	–	125	–	–	76	–	–	–	–	–	–
Library	–	469	196	–	–	–	–	–	–	–	135	–	–	–	208	386	263[WO]	176[WO]	87**
Art/Music Room	–	–	194	–	–	–	–	–	–	–	–	30	–	61	–	–	–	–	–
Teacher Work Room	–	–	138	–	–	–	–	–	–	–	34	–	–	–	164	–	–	–	–
Admin. Offices	–	–	–	–	–	–	–	–	–	–	72	–	–	–	–	–	–	–	–
Sanborn Office	–	–	–	–	–	–	–	–	–	–	–	66	–	55	–	–	–	–	–
Teacher Lounge	–	–	–	–	–	–	–	–	–	89	–	–	–	–	117	–	–	–	–
Teacher Work Room	–	–	138	–	–	–	–	–	–	–	34	–	–	–	164	–	–	–	–
Admin. Offices	–	–	–	–	–	–	–	–	–	–	72	–	–	–	–	–	–	–	–
Sanborn Office	–	–	–	–	–	–	–	–	–	–	–	66	–	55	–	–	–	–	–
Teacher Lounge	–	–	–	–	–	–	–	–	–	89	–	–	–	–	117	–	–	–	–
Basement	–	–	227	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 1 Continued

Sample Date:	2010												2011						
	July 22[a]	August 25-27[b]	September 6[c]	September 19[d]	September 27[e]	September 29[f]	October 18 and 19[g]	November 4[h]	November 11[i]	November 20[j]	November 24[k]	December 2[l]	February 23[m]	April 20 and 21[n]	May 21[o]	June 9[p]	July 13[q]	July 14[r]	October 7[s]
Location	**Total PCBs (ng/m^3)**																		
Ceiling plenum (39C)	–	–		562	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Gym	–	–	–	–	–	–	–	–	–	–	–	38	–	29	–	–	–	–	–
Sped Office	–	–	–	–	–	–	–	–	–	–	–	134	–	86	125	–	–	–	–
Room B	–	–	–	–	–	–	–	–	–	–	–	148	–	–	–	–	–	–	–
Kitchen	–	–	–	–	–	–	–	–	–	–	–	66	–	24	–	–	–	–	–
Room D	–	–	–	–	–	–	–	–	–	–	–	108	–	–	–	–	–	–	–
Hall Office (o/s Art)	–	–	–	–	–	–	–	–	–	–	–	125	–	–	–	–	–	–	–
Worker	–	–	–	–	–	–	–	–	–	–	–	–	–	<4.99	–	–	–	–	–
Room C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	137	–	–	–	–
Outdoors	<3.79	<5.00	<4.20	<4.46	<4.32	<4.44	<5.54	<4.58	<4.60	<4.08	<5.32	<5.95	<4.37	<5.31	4.38	<5.41	<4.99	<4.67	<10.4

PCB polychlorinated biphenyl
ng/m^3 nanograms per cubic meter
– air sample not collected at that location

[a] Initial round of sampling
[b] Samples collected following removal of caulk around exterior window frame
[c] Samples collected following initial optimization of outdoor air delivery and central exhaust, unless otherwise noted.
[d] Samples collected under optimization of outdoor air delivery and central exhaust, and indoor caulk encapsulation, unless otherwise noted.
[e] Samples collected under optimization of outdoor air delivery and central exhaust, partial indoor caulk encapsulation, and isolation of ceiling tiles.
[f] Samples collected under reduced outdoor air delivery, central exhaust, full indoor caulk encapsulation, and isolation of ceiling tiles.
[g] Samples collected under isolation, encapsulation and air cleaner configurations.
[h] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[i] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[j] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[k] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[l] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[m] Samples collected under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.
[n] Samples collected under winter outdoor air delivery (70 °F set point), mini-wall, and full indoor caulk encapsulation. Windows closed.
[o] Samples collected under summer outdoor air delivery (70 °F set point, exhaust on at 8:00 a.m.), mini-wall, and full indoor caulk encapsulation. Windows closed.
[p] Samples collected under summer outdoor air delivery (63 °F set point, exhaust on at 6:00 a.m.), mini-wall, and full indoor caulk encapsulation. Windows closed.
[q] Samples collected under summer outdoor air delivery (63 °F set point, unit vents and exhaust on 24/7 as described in 8.29.11 Memo), mini-wall, and full indoor caulk encapsulation. Windows closed unless noted.
[r] Samples collected under summer outdoor air delivery (63 °F set point, unit vents and exhaust on 24/7 as described in 8.29.11 Memo), mini-wall, and full indoor caulk encapsulation. Windows closed unless noted.
[s] Samples collected under winter outdoor air delivery (68 °F set point, unit vents and exhaust on). Windows and doors closed.

* PCB concentration analysis performed by Alpha Analytical Inc., using U.S. Environmental Protection Agency (EPA) Method 10A (GC/MS-SIM).
** Average of sample and sample duplicate results
† Samples collected under minimum outdoor air delivery.
‡ Sample collected with supplemental air outdoor air (1,200 cubic feet per minute).
AF Sample collected with charcoal air filter running in the classroom.
WO Sample collected with classroom windows and doors open.